

The oil palm stearoyl-acyl-carrier-protein desaturase (Des) promoter drives transient gene expression in tomato fruits and is affected by gibberellic acid

ABSTRACT

Stearoyl-acyl-carrier-protein (ACP) desaturase gene plays an important role in oil palm mesocarp where main substrate stearic acid is converted to oleic acid. In this study, β -glucuronidase (GUS) activity regulated by the oil palm stearoyl-ACP desaturase promoter (Des) and the effects of gibberellic acid (GA3) treatment on promoter activation were evaluated in transgenic tomato. A high level of GUS activity in transformed tomato (*Solanum lycopersicum*) revealed that Des promoter is active in heterologous system. With histochemical assays, we detected GUS activity in all of the agroinfiltrated tomato tissues. Fluorometric GUS assays indicated that the GUS activity was markedly higher when regulated by the Des promoter constructs in comparison with the CaMV 35S promoter. The analysis of 5' deletion of the Des promoter indicated that the GUS activity driven by a 590-bp region were approximately 1.2-fold stronger than that of the full-length Des promoter. Semi-quantitative reverse transcriptase PCR results also showed that the 590-bp region of Des promoter directed the highest level of uidA expression. The GUS activity of Des1-transformed tomato mesocarp was induced by 1.7-fold, whereas the expression driven by the shortest promoter fragment of Des4 was reduced by 1.9-fold following incubation with 10 μ M GA3. These results suggest that gibberellic acid-responsive elements reside within the region between nt -590 and nt -306 of the Des promoter, and based on our 5' deletion analysis, the cis-element(s) necessary for strong promoter activity is also located within the region from -590 to -306 from the transcriptional start site. The oil palm Des promoter was activated by GA3 and is potentially useful for engineering fruit-specific gene expression to enhance quality of fruits.

Keyword: Agroinfiltration; Cherry tomato; Gibberellic acid; Oil palm; Stearoyl-ACP desaturase promoter